

We Claim:

1. A conductive material having the general formula $A_n M_m M'_n Q_{2n+m}$ wherein:

A is at least one element selected from the group consisting of Li, Na, K, Rb, Cs, Tl, and Ag;

M is at least one element selected from the group consisting of Pb, Sn, Ge, Ca, Sr,

5 Ba and any divalent transition metal;

M' is at least one element selected from the group consisting of Bi and Sb; and

Q is at least one element selected from the group consisting of Se, Te and S.

2. The conductive material of Claim 1 wherein n and m are integers.

3. The conductive material of Claim 1 wherein the material possesses an NaCl-type cubic lattice structure.

4. The conductive material of Claim 1 wherein A is K, M is Pb and M' is Bi.

5. The conductive material of Claim 1 wherein A is Ag, M is Pb and M' is Bi.

6. The conductive material of Claim 1 wherein A is K, M is Sn and M' is Bi.

7. A semiconductor device comprising the conductive material of Claim 1.

8. An infrared detector comprising the conductive material of Claim 1.

9. A photovoltaic element comprising the conductive material of Claim 1.

10. A multispectral sensor comprising the conductive material of Claim 1.

11. A thermoelectric device comprising the conductive material of Claim 1.

~~12.~~ A solid solution comprising a conductive material having the general formula $A_n M_m M'_n Q_{2n+m}$ wherein:

A is at least one element selected from the group consisting of Li, Na, K, Rb, Cs, Tl, and Ag;

5 M is at least one element selected from the group consisting of Pb, Sn, Ge, Ca, Sr, Ba and any divalent transition metal;

M' is at least one element selected from the group consisting of Bi and Sb; and

Q is at least one element selected from the group consisting of Se, Te and S.

13. The solid solution of Claim 12 wherein A is at least two elements selected from the group consisting of Li, Na, Rb, Cs, Tl and Ag.

~~14.~~ The solid solution of Claim 12 wherein Q is at least two elements selected from the group consisting of Se, Te and S.

~~15.~~ The solid solution of Claim 12 wherein M' is Bi and Sb.

~~16.~~ The solid solution of Claim 12 wherein M is at least two elements selected from the group consisting of Pb, Sn, Ge, Ca, Sr, Ba and any divalent transition metal.

~~17.~~ The solid solution of Claim 12 wherein the solid solution possesses a NaCl-like cubic lattice crystal structure.

~~18.~~ A semiconductor device comprising the solid solution of Claim 12.

~~19.~~ An infrared detector comprising the solid solution of Claim 12.

~~20.~~ A photovoltaic element comprising the solid solution of Claim 12.

~~21.~~ A thermoelectric device comprising the solid solution of Claim 12.

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22.
(a)

A P-type conductive material comprising:

(a) a conductive material having the general formula $A_nM_mM'_nQ_{2n+m}$ wherein:
A is at least one element selected from the group consisting of Li, Na, K, Rb, Cs, Tl, and Ag;

M is at least one element selected from the group consisting of Pb, Sn, Ge, Ca, Sr, Ba and any divalent transition metal;

M' is at least one element selected from the group consisting of Bi and Sb;
and

Q is at least one element selected from the group consisting of Se, Te and S;

(b) a dopant.

23.

The P-type conductive material of Claim ~~22~~³², wherein the dopant is selected from a group consisting of Ge, Sn, Pb, Al, Ga, In, Ti and mixtures thereof.

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24. An N-type conductive material comprising:

(a) a conductive material having the general formula $A_nM_mM'_nQ_{2n+m}$ wherein:
A is at least one element selected from the group consisting of Li, Na, K, Rb, Cs, Tl, and Ag;

M is at least one element selected from the group consisting of Pb, Sn, Ge, Ca, Sr, Ba and any divalent transition metal;

~~M' is at least one element selected from the group consisting of Bi and Sb;~~
and

Q is at least one element selected from the group consisting of Se, Te and S;

and

(b) a dopant.

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25. The N-type conductive material of Claim 24 wherein the dopant is a SbX_3 , wherein X is a halide.

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26. The N-type conductive material of Claim 24 wherein the dopant is BiX_3 , wherein X is a halide.

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27. The N-type conductive material of Claim 24 wherein the dopant is Hg_2Cl_2 .

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28. The N-type conductive material of Claim 24 wherein the dopant is DX_2 where:
D is at least one element selected from the group consisting of Cr, Mn, Fe, Co, Ni, Cu, Zn and Mg; and
X is at least one element selected from the group consisting of Cl, Br and I.

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29. The N-type conductive material of Claim 24 wherein the amount of dopant is from 0.0001% to 4% by weight.

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30. A thermoelectric device comprising the N-type conductive material of Claim 24.

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31. A semiconductor device comprising the N-type conductive material of Claim 24.

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